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Public Comment to Report and Order FCC 03-324 As Published in the Federal Register Vol. 62, No. 148, Tuesday, August 3, 2004 Rules and Regulations

Prepared by:

The Johns Hopkins University

Applied Physics Laboratory

11000 Johns Hopkins Road

Laurel, Maryland 20723-6099

1 SCOPE

Since the introduction of FCC 02-302 and the release of the Federal Communications Commission Spectrum Policy Task Force Report ET Docket No. 02-135, November 2002, "the Commission" has demonstrated a propensity to entertain, acknowledge, and include the recommendations to policy regarding the usage of the 5.85 – 5.925 GHz frequency band for Dedicated Short Range Communications (DSRC) Services (DSRCS) as proposed by the DSRC Standards Writing Group. At this critical point in time, prior to the instantiation of the licensing and servicing rules described in Report and Order FCC 03-324, to be adopted October 4, 2004, we are obligated to inform the Commission that these rules are inadequate to assure both maximum utilization of the frequency band and minimal interference to and from co-primary band users. In this public comment to this Report and Order, the Johns Hopkins University Applied Physics Laboratory (JHU/APL), as a contracted representative of the Federal Highway Administration (FHWA) and member of the DSRC Standards Writing Group, presents results acquired from coordinated studies with the Satellite Industry Association which demonstrate that there is more to be considered in the licensing of Roadside Units (RSUs) than has been provided in FCC 03-324. Also, recommendations are provided that modify the licensing process to include all types of DSRC platforms and allow for better track registration and maximum channel usage in a more equitable fashion.

2 CO-PRIMARY SERVICE ISSUES

2.1 Background

In 1999, prior to the release of any standards regarding DSRC operations, the FHWA sponsored a spectrum survey of the 5250-5925 MHz band in order to gain insight into the electro-magnetic environment by identifying the different, co-primary, emitter types and their interference potential. The completed report entitled "Measured Occupancy of 5850 – 5925 MHz and Adjacent 5-GHz Spectrum in the United States", NTIA Report 00-373[1], was influential in the NTIA's decision to adopt the military radar isolation requirements, as reported in 47 CFR Part 90.371(b). However, the report also indicated, based on a limited study of Fixed Satellite Service (FSS) earth stations, that the measured power density from these sites is less than half that introduced by the military radars, and drops rapidly to an acceptable level within a kilometer or less. Therefore, according to the NTIA report "Co-channel operations of DSRC systems and FSS earth stations should be avoided. This can be accomplished through existing frequency coordination mechanisms."[2]

The DSRC Standards Development Group was formed to specify architecture, develop a channeling plan, and create rules for operation for DSRC in support of the "national architecture" as proposed by the Intelligent Transportation Society of America (ITS America). On 9 July 2002, ITS America filed Ex Parte Comments to the Commission

[1] Frank H. Sanders, "Measured Occupancy of 5850-5925 MHz and Adjacent 5-GHz Spectrum in the United States", NTIA Report 00-373 to U. S. Department of Commerce, William M. Daley, Secretary, December 1999

[2] Ibid, p. 27.

indicating proposed recommendations regarding DSRC band utilization and licensing. On 15 November 2002, the FCC responded by releasing a Notice of Proposed Rulemaking and Order in the matter of WT Docket No. 01-90, entitled “Amendment of the Commission’s Rules Regarding Dedicated Short-Range Communication Services in the 5.850-5.925 GHz Frequency Band (5.9 GHz Band)” and ET Docket No. 98-95 RM-9096 entitled, “Amendment of Parts 2 and 90 of the Commission’s Rules to Allocated the 5.850-5.925 GHz band to the Mobile Service for Dedicated Short Range Communications of Intelligent Transportation Services”, FCC 02-302. In that document, the precursor to this Report and Order, the FCC presented a proposed ruling for utilization of this band and sought feedback for this plan. Many members of the DSRC Standards Development Group submitted commentary and recommendations. Of the replies received, two gave the Commission cause to take notice: one reply came from PanAmSat, and another claim originated from the Satellite Industry Association (SIA). Both papers[3] stated that the existing “noise floor” created by Fixed Satellite Service (FSS) earth station uplink operations is much higher than reported by the NTIA, as presented in NTIA Report 00-373. While not worried about collective emissions from the DSRC RSUs, the FSS group was concerned that no plan was presented to develop a safe separation zone around the existing FSS earth stations so that both FSS and DSRC services could operate without fear of interference problems. As the incumbent, the FSS service should not be required to modify existing installations in the event that new RSU installations are located too close and experience degraded performance.

The problem with the NTIA Report 00-373 analysis, as pointed out by the SIA, was that it drew conclusions about the earth station uplink based upon a snapshot in time, when the earth station was in a particular orientation, emitting a particular sidelobe pattern. The pattern could change any time the antenna is redirected to any satellite within the constellation of the licensed arc of communications. The effective radiated power from an earth station could also dramatically change as a result of the new look angle, modulation, output power and bandwidth afforded to that uplink. Additional motivation for reexamining the NTIA report stems from the fact that, at the time the NTIA study was conducted, the DSRC channeling plan was not available. Because the existing DSRC channeling plan (as recommended by the DSRC Standards Writing Group) proposes to utilize the entire bandwidth for different channels of communication, it would be impossible to avoid interference from in-band, high data rate, large bandwidth earth station operations.

ITS America concurred that further study was necessary to determine the magnitude of the existing and future FSS environment, and its potential impact on future DSRC installations. In addition, in their docket, the FCC favored geographic licensing of the RSUs -- a measure completely contrary to the ITS America and DSRC Standards Development Group plan for site licensing. Individual site licensing is the method currently employed for FSS earth stations and the other co-primary service: point-to-point microwave. By default, it will be essential to maintain this or a similar policy when

[3] Henry Goldberg, Joseph A. Godles and Brita Dagmar Strandbert, “Comments of PanAmSat Corporation”, March 17, 2003 and Richard DalBello, President, “Reply Comments of the Satellite Industry Association”, April 15, 2003.

coordinating installations with the FSS service. ITS America requested that lawyers from the firm of Squire, Sanders and Dempsey (SSD) coordinate the study by involving members from both the DSRC Standards Development Group and the SIA.

The result was the formation of the FSS Interference Study Group. Membership consisted of participants from the three firms providing technical guidance to FHWA/ITS America -- JHU/APL, ARINC and Mitretek Systems -- and, of course, a representative from ITS America and their legal staff at SSD. The SIA provided engineers and legal council from PanAmSat, New Skies, and Intelsat.

2.2 Analysis Process

The FSS Interference Study Group collectively developed the following objectives:

- Determine what the interference potential of in-band FSS earth stations is to the emerging DSRCS.
- Determine how to present this information to the FCC.
- Determine how to best apply the results of the study to develop a procedure that could be implemented in licensing future DSRC RSUs and FSS earth stations.

The chronology of this study and final results are summarized below. Point-to-point microwave links were purposely excluded due to the height of the stations, and the fact that a license search of the FCC database did not yield any current users within this band. A more detailed description with additional results can be found in a soon-to-be-released report from JHU/APL to the FHWA on this effort.

2.2.1 Interference Analysis Process

Currently, the FSS and point-to-point microwave services resolve potential site licensing problems through detailed propagation analyses conducted by specialized commercial services. Their standards (47 CFR Parts 25 and 101) describe all pertinent parameters in the same manner and units of measurement to facilitate electro-magnetic interference analyses. As DSRC differs dramatically from these other systems in operation and RF characteristics, it was essential to translate the existing pertinent parameters and determine values for all other data.

A review of 47 CFR Part 25 indicated that depending on the transmission requirements, the earth stations can employ channels with necessary bandwidths up to 36 MHz, as stipulated in the table. Using the emission (mask) limitation information from their standard, the total band of frequencies that a single 36 MHz channel of FSS earth station can impact covers 180 MHz. Since this number exceeds the 75 MHz bandwidth afforded DSRC/WAVE operations, it is certain that in-band operations of the FSS will interfere with DSRC/WAVE devices within proximity. This finding completely negates the recommendation that the NTIA made in NTIA Report 00-373 and footnote 195 of FCC

03-324[4]. Regardless of how an earth station is currently employed, as long as it is licensed to use the high bandwidth channels, it may do so at any time; ignoring this fact would be a grave mistake regarding the installation of RSUs.

A similar analysis using an adjacent band earth station uplink channel was prepared by JHU/APL and reviewed by SIA members. It demonstrated that adjacent band operation, especially on the lowest frequency channels, has the potential to greatly interfere with DSRC operations.

The next step in the analysis was to acquire sufficient information on in-band earth stations from the FCC files to determine:

- the number of FSS sites,
- the actual operational limitations of these sites,
- their realistic potential for interference to RSUs.

To expedite data collection on licensed in-band FSS sites as well as provide detail on site operations and other data not available in the FCC licenses, Comsearch, a spectrum management company responsible for frequency coordination, trusted by the SIA, was added to the team. Comsearch's database revealed that there are fewer than 120 FSS earth station installations within the U. S., many of which are co-located. Accumulating the necessary, detailed site data for each location would allow for automated, computer-based interference analysis in future RSU licensees. Any RSU to be licensed could be tested for sufficient isolation against incumbent RSUs and any nearby Government radar sites. Additionally, RSUs could be tested against any established FSS earth station site in the same area.

2.2.2 The "Interference Contour"

All earth stations are licensed to operate over specific horizons/arcs and within specific antenna elevation limits. Fortunately, all FSS earth stations within band look at the same constellation of satellites; however, the look angle changes as a function of location of the earth station. Look angle is a critical factor in dictating the amount of interference that can be created by the earth station and the direction in which it is focused. Currently, a "coordination distance" is defined for the earth station, as the area it can create harmful interference to a station within the fixed or mobile service sharing the same frequency band.[5] As DSRC devices would be located throughout the highways, thereby potentially encircling an earth station, a plan was devised by the FSS Interference Study Group to extend this definition to an interference contour.

Thus, the interference contour, i.e. mitigation zone plot, is a composite mapping of all of the worst case side lobe and rear lobe emissions from an earth station to a specified interference objective as a function of its licensed latitudinal and longitudinal arcs. It is a

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[4] "In allocating the 5.9 GHz band for DSRC operations, the Commission noted, in part, that seventy-five megahertz of spectrum 'will provide the flexibility needed to share the spectrum with incumbent operations."'

[5] 47 CFR Part 25, Section 25.201.

"graphical representation of the effects of the earth station transmitter's power, the RSU antenna gain, the RSU's maximum permissible interference power criteria, and the earth station horizon gain."[6] Therefore, rather than a snapshot of the performance of the uplink antenna at any one time, as was used in NTIA Report 00-373, a mitigation zone plot provides information to the future RSU regarding what interference it may encounter as a function of the licensed capabilities of the earth station.

The dangers from drawing conclusions regarding an FSS earth station's emissions based upon an instantaneous measurement, as used in NTIA Report 00-373, are now evident. The earth station's license is so flexible that a recorded measurement need not mark the worst case modulation, output power, or frequency for even a single uplink communication to a particular satellite. Communication demands can require the dish to reorient to a different satellite at any time, where its ground emissions can vary greatly. Therefore, if it is determined that an RSU needs to be installed within an interference contour, a more detailed interference analysis is warranted. This fact – that mitigation zones identify *potential* problem areas – should be kept in mind when interpreting the results presented later in this document.

It was determined by our interference study committee that the interference zone should become the primary tool in the licensing of both future RSUs and FSS earth stations. If an RSU site falls outside both the Government radar and FSS earth station interference zones, its only potential source of in-band interference is another RSU. Likewise, if the FSS desires to install a new earth station, it can conduct the same interference analysis to determine which RSUs, if any, reside within its zone, and what measures/restrictions are necessary to reduce the interference to a point where both can operate.

2.2.3 Interference Study Specifics

The FSS interference study group selected nine earth station sites to represent the different FSS-satellite orientations: Atlanta, GA; Boston, MA; Fargo, ND; Brewster, WA; San Francisco, CA; Three Peaks, CA; Lincoln, NE; Miami, FL; and Desoto, TX. These sites were specifically chosen to represent the northern, central, and southern portions of the east cost, west coast, and central U. S. Again, the reason for selecting multiple sites stems from the fact that the contour for each region changes as a function of the arc and look angle necessary for the earth station to see the satellites within its constellation.

Prior to developing the contours, one additional factor was added; RSU antenna gain in the direction of the earth station. It is envisioned that RSUs will employ directive antennas to assist in zone control. As highway directions vary in relation to the earth stations, it was determined that, rather than use one number for antenna gain, three different gains should be examined to define favorable or unfavorable orientations: +6 dB, 0 dB and -6dB towards the earth station. Thus, three curves would be required for each site. In this manner, benefits of employing antenna pattern shaping could be evaluated, as well as deleterious effects created by selecting a directive RSU antenna

[6] Comsearch Memorandum entitled "DSRC-FSS Mitigation Zones" from Ken Ryan, Comsearch to Pankaj Karnik, JHU/APL, January 9, 2004.

whose orientation for highway usage is such that it would actually add to the earth station interference signal.

Our committee decided that an elaborate propagation model may be required to accurately define the DSRC interference zone. After conducting a detailed search of commercial and military propagation models, an appropriate model was found that had been developed at JHU/APL for U. S. Navy applications. It is a proprietary, validated physics-based model. This approach was taken to more accurately account for terrain blockage, refraction, and diffraction at specific sites (lat/lon) on the earth. Once the impact of these effects could be assessed, simpler models could be compared to determine their validity for future contour predictions.

Onboard units (OBUs), while mobile, have the advantage over RSUs of additional earth station interference signal attenuation through both multipath and their much lower antennas. This allows the OBUs to communicate with each other at much closer ranges to the FSS earth station than they can communicate with the RSUs. While it was not practical to model multipath for the OBUs, as it is unique to every location and varies tremendously, it was decided to develop a contour for them to assess what general reduction in contour size could be realized. RSU and OBU antenna heights were assumed to be 9 meters and 1 meter, respectively.

A plot displaying the contours for these gains with respect to a FSS earth station in free space is shown in Figure 1 below. While "free space" is not the environment encountered for propagation, it is important to realize the tremendous side and rear lobe energy produced by the earth stations that needs to be attenuated in the directions indicated if RSU operation is to be possible. This plot demonstrates how invaluable antenna directivity can be to the RSU antenna.

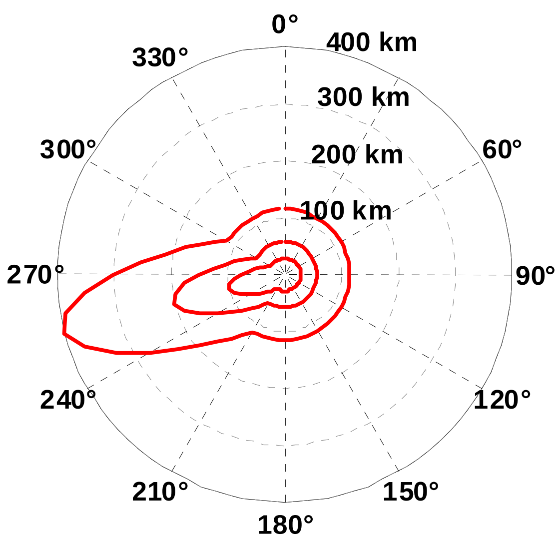

Figure 1. – -6 dB, 0 dB and +6 dB Free Space Mitigation Zone Curves

Our model considered terrain blockage and diffraction. Site-specific terrain blockage was found to be an extremely important factor in this study, as is terrain diffraction, due to the RSU's relatively low interference threshold. Based on the significant sidelobe and rear lobe emissions from the FSS earth station antenna, it was learned that diffracted energy could potentially cause interference problems to the RSU. This is illustrated for the Atlanta, GA site in Figures 2 and 3. Due to diffraction, the predicted interference zones (Figure 2) extend beyond the line-of-sight visible regions (Figure 3) even with favorable (-6 dB) received gain, i.e. the -161 dBW/4kHz brown region in Figure 2.

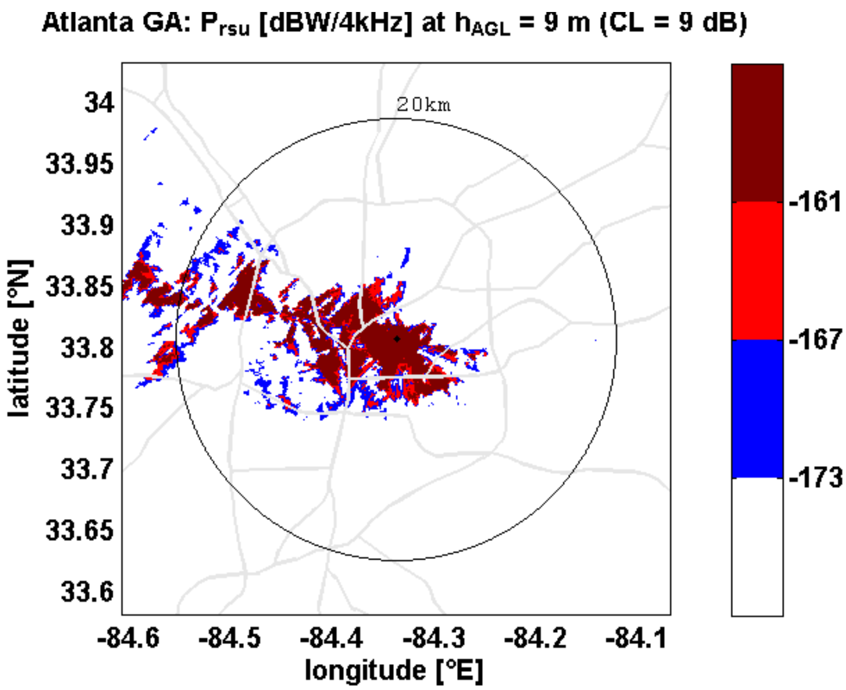

Figure 2: Interference zones for the three RSU antenna directivities as brown (-167 dBW/4kHz + -6 dB directivity), red (-167 dBm + 0 dB directivity) and blue (-167 dBW/4kHz + 6 dB directivity).

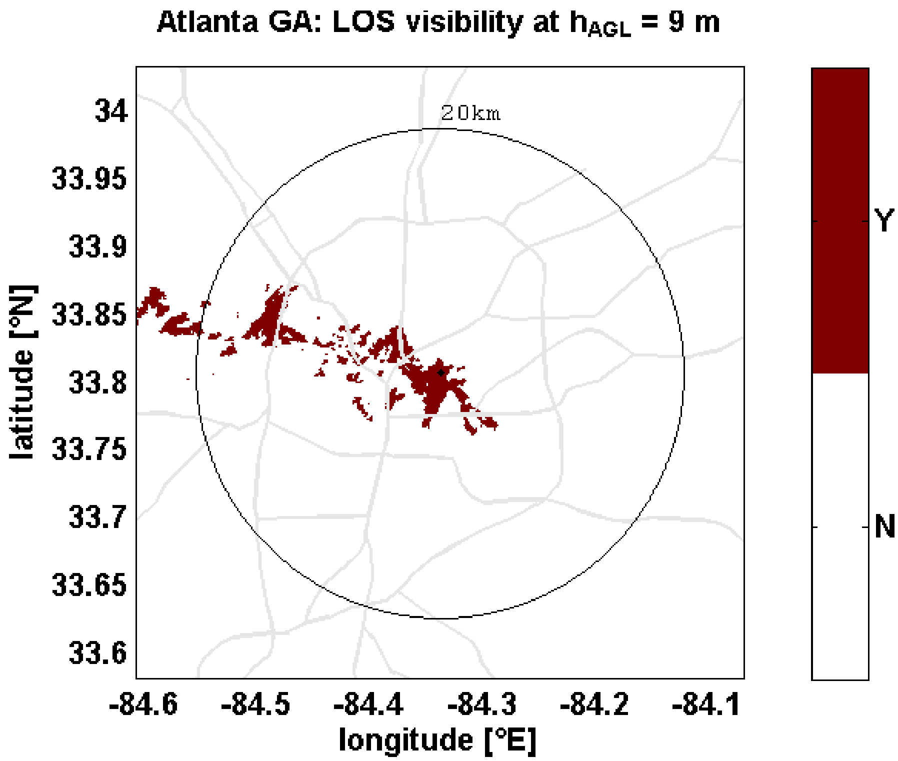

Figure 3: Line-of-sight visible regions (brown = visible), calculated using 4/3 for k-factor to account for standard-atmosphere radar-path curvature.

Site-specific terrain for this study was obtained from the Digital Terrain Elevation Database (DTED), a product of the National Geospatial-Intelligence Agency (NGA).[7] NGA produces DTED in various levels; higher levels have better horizontal resolution. Our mathematical modeling tool was compatible with level-1 DTED, which provides a data point every 100 meters.

2.2.4 Generating Mitigation Zone Maps

It was determined that the best way to display the "output" would be via maps that include the major highways within the interference zones. This would allow site-specific predictions of the worst-case, in-band, interference potential of the selected earth stations. The US Census web site (http://tiger.census.gov/cgi-bin/mapbrowser) is a source of base maps showing roads, streams, and urban areas.

Once the plots were created, it was evident that display a much larger interference zone existed than was alluded to in the NTIA report. Also, the advantages of RSU antenna directivity vary dramatically with the different sites. Line-of-sight plays a large role in equalizing the three zones when compared to the free space contour plot as shown in Figure 1.

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[7] For more info, see "Performance Specification Digital Terrain Elevation Data (DTED)," MIL-PRF-89020B (23 May 2000).

Radar fences and berms are successful mechanisms utilized in heavy suburban/city locations to permit closer than otherwise possible location of point-to-point microwave and FSS earth station sites. Their potential presence at any/all of the sites selected was not considered in the analyses. Depending on location within the country, higher fences can be constructed at some sites that afford 15 to 20 dB or more attenuation[8]. Depending on the site, the radar fence should provide a more restricted interference contour from that displayed in our results.

2.3 Summary and Conclusions Drawn From the FSS Interference Study

Prior to the advent of DSRC, point-to-point microwave and FSS earth station installations were the main users of the 5.9 GHz band in the U. S. Coordination of licensing between these co-primary users was a fairly simple, controlled process involving one-on-one interference analyses; processes that were handled through commercial enterprises such as Comsearch. DSRC will eventually disrupt this scenario by introducing a densely populated background of low Effective Incident Resident Power (EIRP) users into an RF environment held by relatively few high powered users. Consequently, it is essential to determine 1) the interference potential between DSRC and existing services, and 2) how to coordinate future resources in the most efficacious fashion.

In their collective and individual responses to Notice of Proposed Rulemaking and Order in the matter of WT Docket No. 01-90, the SIA voiced its concerns about initial studies conducted for the NTIA, as these studies had concluded that there would be very little potential for interference to DSRC equipment from FSS earth stations. However, measurements of uplink power taken at any one time reflect only a “point sample” of the potential interference pattern that can be produced as the earth station tracks members of its satellite constellation. As a result, the FSS interference study group was formed to investigate these claims. The group’s findings are that, based upon allowable emissions as set forth in FSS earth station licenses, the SIA’s concerns are valid.

As DSRC equipment (RSUs and OBUs) can completely surround FSS earth station sites, it is important to consider the full interference potential of all existing and future FSS sites. The best analysis approach is to produce an interference contour for each site that bounds the worst case emissions from the earth station for every permitted azimuth. This worst-case emission is then compared to the interference objective/threshold of the affected DSRC devices, accounting for terrain and atmospheric effects. Regions in which the predicted emissions exceed the DSRC device threshold are flagged as potential interference zones. When this analysis is applied to existing FSS earth station sites, any planned DSRC device operation within this zone could experience interference, and may require a more detailed interference analysis prior to acquiring an operating license. Conversely, any DSRC device operating outside of this zone could be assured that it would not encounter interference from the subject earth station. When this analysis is

[8] See, for example, J. E. Becker, J. C. Sureau, “Control of Radar Site Environment by Use of Fences”, IEEE Transactions on Antennas and Propagation, Vol. AP-14, No. 6, November 1966; and Joel. E. Becker Robert E. Millette, “A Double-Slot Radar Fence for Increased Clutter Suppression”, IEEE Transactions on Antennas and Propagation, Vol. AP-16, No. 1, January 1968.

applied to a future FSS site, the zones indicate whether a detailed analysis would be required to determine if additional signal mitigation mechanisms are warranted to permit interference-free FSS site operation. Also, for established FSS sites, if a sufficient number of RSUs could be excluded or forced to operate with reduced performance in their interference contour, then it may be economically feasible for a suitable radar fence to be erected around the site.

While the satellites, uplink channels, modulation and EIRP remain very consistent between the earth stations in this band, their locations in relation to local terrain and satellite trajectories dictate the interference zones. Therefore, rather than determining an interference zone for one candidate site, nine representative sites were selected to demonstrate the interference potential within the north, central, and southern portions of the east coast, west coast, and central U. S. JHU/APL's propagation model was employed to handle the analysis, as research indicated it to be a reliable, accepted tool capable of considering all terrain factors and beyond line-of-sight conditions. The results from these studies indicate that the interference from every earth station cannot be based upon one station's operations. There is a large potential for interference from the earth stations to the DSRC system within considerable range of the earth station.

Again, it must be stressed that the interference plots depict what *could* happen to a DSRC installation at a given location, in a worst-case situation; they are not "snapshots" of the actual interference to the DSRC system produced by an FSS site. Actual interference depends on questions like, "How often, if at all, will the earth station communicate with the satellite that would create interference in the area that is a desirable RSU location?" In the case of an existing FSS site, this question can only be answered by that site. This question must also be asked before installing a new FSS site in an area populated with RSUs. By simply limiting the satellites that the earth station can communicate with, or channels that it can operate on, collocation may be possible. In addition, there are other site-specific factors that should be taken into consideration when deciding whether *actual* interference will be experienced in these regions of predicted *potential* interference. Additional factors may include berms, radar fences, and other man-made structures unique to this location which would further restrict the size and shape of the site's interference zone. Note also, that the interference analyses conducted required more information regarding the earth stations than is available in the FCC database. Much of this data is in the possession of the contracted licensing companies.

The interference analysis was intentionally conducted to a high degree of accuracy in order to permit comparison to commercial vendor products. In this manner, existing 47 CFR Part 25 – Part 101 license coordinators can assess their products' performance and determine the adequacy of their models. Once a decision is made to install an RSU within an interference zone, standard point-to-point analysis, as currently implemented between the FSS and point-to-point microwave, should be employed. Thus, the installation of DSRC RSUs within the 5.9 GHz band incurs only **one additional step** in the existing in-band licensing scheme between co-primary services. As there are approximately only 120 5.9 GHz earth station sites throughout the country, this level of analysis is very straightforward; permitting database storage and web-based licensing.

The current analysis excluded point-to-point microwave as a threat, due to the relative height difference and the fact that no licensed users could be found in-band for comparison. Typically, the upper adjacent frequency bands (5.925 – 6.425 GHz) are preferred by this service. Interference from Government radars, which also have a very limited number of installations, is considered to be adequately defined by the prior NTIA studies and current rules and regulations. Our analysis indicated that, while there are a limited number of high EIRP co-primary users to coordinate within band, the 5.925 – 6.425 GHz bands are much more populated by thousands of those services. It would be a **tremendous mistake** for any potential RSU licensee to assume that, because there is no in-band interference noted from earth stations, that there will be no interference in the 5.9 GHz band. It would also be a mistake not to have that information in a database to apprise the applicant of any potential risk. Again, it is essential that an analysis similar to the one outlined above be conducted concurrently by a commercial service when an applicant applies for an RSU license.

In response to the licensing practices recommended in Paragraph 59 of FCC 03-324, JHU/APL recommends that a database be created for RSU applications that include the information currently stored by all of the commercial vendors on point-to-point microwave and FSS earth station site licensing. Used in conjunction with adequate environmental terrain modeling, the database would compare all existing, fixed co-primary site RF parameters against the location selected for the new license in order to identify any installation risks. As noted in our analysis, the fact that an earth station is not currently utilizing a channel that it has a license for, does not preclude its usage in the future. Without identifying all potential risks, it is not possible to conduct adequate negotiations to inform the applicant of operation limitations. These limitations could include communication zone shaping, potential channels of operation, etc. It is hoped that many of the practices and procedures under development for the 70-80-90 GHz services will become applicable to RSU licensing. The fear that the process could become complicated should be assuaged by the fact that this type of analysis is already automated and managed through base-lined, standardized algorithms. As such, the cost of licensing should be minimized, as multiple organizations need not become involved in the process.

3 ADDITIONAL CONSIDERATIONS

In the development of the 70 MHz channeling plan for the DSRCS, the DSRC Standards Writing Group has attempted to conform with the “Exclusive use” model as described in the Spectrum Policy Task Force Report, ET Docket No. 02-135 where, through specific and controlled channel assignments to each licensed user, the Commission would provide the “…technical rules to protect spectrum users against interference”.[8] Private users would “lease spectrum usage rights”[9], relinquishing this capability on an irregular or momentary basis, as the channels are temporarily required for public safety emergency broadcasts. This technique would ensure a “…balanced spectrum policy that includes both the granting of exclusive spectrum usage rights through market-based mechanism

[8] Federal Communications Commission Spectrum Policy Task Force Report ET Docket No. 02-135, November 2002, p.5.
[9] Ibid, p.6.

and creating open access to spectrum 'commons', with command-and-control regulation used in limited circumstances".[10] However, the policy that the Commission intends to adopt, "…non-exclusive geographic-area licenses authorizing operation on seventy megahertz of the 5.9 GHz bandwidth"[11] appears counter-productive in realizing these goals. The Commission further states that "Regarding our decision to use non-exclusive geographic area licensing…(w)e do not believe that there will be any significant adverse effect on small entities. We believe that this licensing approach will actually benefit small entities by enabling them to obtain licenses to obtain a DSRC service".[12]

The channeling plan was devised by the DSRC Standards Writing Group to allow a maximum number of users to utilize DSRC services, with no preferences to conglomerates over the "mom & pop" operations other than that afforded under the first come, first served policy adopted for co-primary users. In this manner, for example, a bank, a parking garage, a fast food service and a gas station could all share the DSRC spectrum with their own, controlled zones of operation and the knowledge that there would be no interference on their service channel by their neighbors. These services would not require more than a single channel for their secure, controlled transactions. Additional secure services, such as internet, could be provided on another service channel that is different from the one being used by their adjacent neighbor(s). Any non-secure functions could be handled on the U-NII band channels, incorporated into the DSRC OBUs and RSUs.

The concept presented by the Commission for channel sharing relies on power control and antenna directivity as the only mechanisms afforded to preclude interference from neighbors. When provided with the option to request operation on all DSRC channels, most licensees will likely do so. In that manner, the licensee could then act as a local spectrum manager within his/her communication zone, thereby dictating what the next user can and cannot do on the spectrum. Thus, "small entities" would be discouraged from using this service. Channel assignment has always been the established/best method of precluding interference in a congested environment. As stated on page 4 of the ET Docket No. 02-135, "Interference management has become more difficult because of the greater density, mobility and variability of radio frequency (RF) emitters. Interference management becomes even more problematic when and if users have been granted increased flexibility of their spectrum use". This is why the DSRC Standards Writing Group recommends limited and controlled/coordinated channel assignments; especially to adjacent users.

The implementation of "non-exclusive" geographic area licensing including full band usage to each licensee per paragraphs 54 – 59 of FCC 03-324 appears contradictory to the Commission's understanding of the need for communication zone control as described in Paragraph 37 of that document. In this paragraph the Commission states that, "Specifically, it is projected that the density of microwave links will be much higher in this band than for current microwave bands, because RSU transceivers will be placed in

[10] Ibid, p. 3.
[11] FCC 03-324, p. 46438.
[12] Ibid, p. 46439.

close proximity to one another, anywhere from 100 to 1000 meters…We conclude, therefore, that it is safer and in the public interest, given the current development of the band, to use the emission mask and formulas in the ASTM-DSRC Standard as the technical regulatory framework for the band”. As it is understood and stated that it is essential to use this mask in conjunction with the power limitations of ASTM E2213 to afford adjacent channel operations, it is not possible for adjacent users to share the same channels of operation. Therefore, we believe that the “post license registration process” as proposed in Paragraph 59 is essential, but should be conducted as a preliminary part of the licensing process versus a post registration action. It is more efficient to eliminate the potential for conflict during the registration process than handling interference conflicts resulting from shared assignments of frequencies.

Our final recommendation is that the Commission considers not two, but three categories of DSRC devices: the RSU, the OBU and the Public Safety OBU (PSOBU). In Section 5 of our public comments to NPRM 02-302[13], we provided definition and expressed the critical need for this category; however, despite the fact that special rules exist and are still being written for this category of device by the DSRC Standards Writing Group, it appears to have been omitted from Report & Order 03-324. The PSOBU differs from the normal OBU in that it can both operate on higher power and be the source of public safety applications. It is envisioned that a PSOBU will be installed in every public safety vehicle. The applications that it will support include traffic light control, warning messages that the safety vehicle is approaching to respond to an emergency, and other emergency situation notifications to the public. As a result this device needs to be safeguarded to the same extent as a current police radio, from falling into the wrong hands, or where illegal operation could create accidents and/or create traffic flow problems within the general vicinity.

[13] “Public Comment to FCC 02-302”, The Johns Hopkins University Applied Physics Laboratory, SSD-PL-03-0164, March 17, 2003, p. 13.